

K&F 'SW' Series Subwoofer Systems



User's Manual

Version 4.0
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**Important Information,
Please Read Before Use!**

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Thank you for your decision to buy a Kling & Freitag sound system. To guarantee a trouble-free operating of the equipment and to allow the KLING & FREITAG - subwoofer system to achieve its full potential please read the operating instructions carefully before use.

With the purchase of a K&F subwoofer system with integrated power amplifier technology, you have acquired a speaker system with the highest possible quality and performance capabilities.

As the owner of this system, you now have a versatile and highly professional tool which, when operated properly, is a true pleasure to use.

Symbols in User's Manual



Warning

This symbol indicates the possibility of life-threatening danger and a health risk for persons. Not following these instructions may result in serious health problems including potentially fatal injuries.



Caution

This symbol indicates a possibly dangerous situation. Not following these instructions may cause minor injuries or cause property damage.



Important

This symbol gives instructions for the proper use of the described products. Not following these instructions may cause malfunctions or property damage.

Information about this User's Manual

User's Manual K&F 'SW' Series Subwoofer Systems, version 4.0, 23.03.2006

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All specifications in this manual are based on information available at the time of publishing for the features and safety guidelines of the described products.

Technical specifications, measurements, weights and properties are not guaranteed.

The manufacturer reserves the right to make product alterations within legal provisions as well as changes to improve product quality.

All persons who use the speaker system must have this guide and all further information for safe operations available to them during assembly, disassembly, and use.

We appreciate any input with suggestions and improvements for this manual. Please send this to us at the following address:

info@kling-freitag.de or to:

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1. General Safety Instructions for Using Speakers

Mounting the speakers

To prevent injury, the speakers must be securely placed on the floor or secured to the wall according to the instructions on page **Fehler! Textmarke nicht definiert.** (Mounting Instructions for Speakers). Please note that speakers can move as a result of vibrations. To prevent them from falling from their mounted position, they must be secured properly. If the weight of the speaker exceeds 20 kg then it is necessary for two people to carry it.

Speakers may only be suspended or mounted to walls or ceilings by qualified personnel. The speakers must be hung by using at least two of the designated flying points. The same applies when lifting and aligning the speakers.

Never use signal cables or power cords for suspending, aligning or securing the systems. When laying the connecting cables, make sure that nobody can trip.

Never hang more than two speakers under one another without using the designated Kling & Freitag rigging equipment.

Ensure that all installation connections comply with the applicable safety guidelines and that the size and strength are sufficient. Further instructions are in our user's manual for assembly equipment and in the general safety instructions for speakers and assembly equipment.

For mobile and fixed installations, use only rigging equipment from KLING & FREITAG. Make sure to observe the included safety and mounting instructions for loudspeakers and accessories.

Speakers and rigging equipment must be visually examined at regular intervals. If there are signs of wear, they must be replaced immediately. Furthermore, screwed connections of supporting parts must be checked routinely.



Protecting the Speakers

In general, audio signals should not be overdriven. This may be caused by mixing consoles, equalizers, effect equipment, etc. and should be indicated on this equipment. When a power amplifier is overloaded at the output (clipping), then the amplifier should activate a clipping warning signal. Power amplifiers can also be overloaded at the input circuit without the amplifier signalling the clipping, i.e. when there is not sufficient headroom in the input circuit. We, therefore, recommend turning up the power amplifiers all the way and adjusting the level before the power amplifier in order to avoid overloading the input circuit. In any case, the signal must be reduced as soon as it sounds unnaturally distorted.

- To protect the speakers from being destroyed and to avoid fire hazard, they should only be operated with professional power amplifiers with the following specifications:
 - integrated clipping limiter
 - without using a Kling & Freitag controller:
Integrated or preceding subsonic filter (approx. 20 Hz, min. 12 dB / octave)

For damage caused by overloading or use with power amplifiers other than those recommended above, Kling & Freitag GmbH does not assume warranty and excludes liability for possible consequential damage.



The following signals may damage the speakers

- permanent high-pitched signals with high frequency, and continuous noise from feedback.
- permanently distorted signals with high power.
- noises, which occur when the amplifier is on while equipment is being connected, disconnected or switched on.

Do not install devices in any of the following places:

- where the devices are permanently exposed to direct sunlight.
- where the devices are exposed to high moisture.
- where the devices are exposed to strong vibrations and dust.



Damage caused by the speakers' magnetic fields

Speakers are permanently surrounded by a magnetic field even when they are not operating. Therefore, during transport and placement of the speakers, it is important to ensure that there is always approx. 1 m between the speakers and magnetic data media and computer/video monitors.



Preventing hearing damage

To prevent the risk of hearing damage, avoid being too close to operating speakers even if the volume level seems to be low enough. In general, volume levels over 90 dB can cause hearing damage.

2. Product Descriptions and Versions

2.1 SW 112

Short description:

Ultra compact high-performance subwoofer for mobile use with exponential tunnel geometry, controllable with system controller, direct-emitting 12" long-excursion chassis, bass reflex tuning.

Enclosure:

Frame-reinforced Finnish Multiplex enclosure with highly resistant black (RAL 9005) structured paint, highly permeable, ball-proof steel grille with exchangeable black acoustic foam. The subwoofer is equipped with a handle, K&M mounting plate with M20 thread for a distance rod, non-abrasive plastic stacking feet and corresponding stacking foot grooves for stacks of identical enclosures.

Optional versions:

- Option 'XO':
Version with integrated low-pass filter (110 Hz) for operations without system controller or signal processor, switchable (XO 'On'/'Off').
- Option 'Suspension':
Suspendable version with 6 flying points 'allsafe Jungfalk'
- Option '100V':
100 volts version with 300VA toroidal transformer
- Option 'Outdoor Mobile'
Version for mobile outdoor applications under roofs.
- Option 'Special Colour':
Special finish in RAL colours
- SW 112 - SP:
Version with integrated power amplifier technology
'SP' speakers are shipped with a special user's manual!

2.2 SWi 112

Short description:

Ultra compact high-performance subwoofer for fixed installations with exponential tunnel geometry, controllable with system controller, direct-emitting 12" long-excursion chassis, bass reflex tuning.

Enclosure:

Frame-reinforced Finnish Multiplex enclosure with highly resistant black (RAL 9005) structured paint, highly permeable, ball-proof steel grille with exchangeable black acoustic foam. The subwoofer is equipped with twelve M12 threads for 'flown' applications or mounting devices.

Optional versions:

- Option 'XO':
Version with integrated low pass filter (110 Hz) for operations without system controller or signal processor, switchable (XO 'On'/'Off').
- Option '100V':
100 volts version with 300VA toroidal transformer
- Option 'Special Colour':
Special finish in RAL colours
- SWi 112 - SP:
Version with integrated power amplifier technology
'SP' speakers are shipped with a special user's manual!

2.3 SW 115E

Short description:

High-performance subwoofer with exponential tunnel geometry, controllable with system controller. 1 15" long-excursion chassis with double centring, bass reflex tuning.

Enclosure:

Frame-reinforced Finnish Multiplex enclosure with highly resistant black (RAL 9005) structured paint. Mounting plate with M20 thread for a distance rod mounted in the top of the speaker, 2 butterfly handles, non-abrasive plastic stacking feet and corresponding stacking foot grooves for stacks of identical enclosures or SW215E and Line 212 enclosures. Locking profiles for optional transport cover, highly permeable, ball-proof steel grille with exchangeable black acoustic foam.

Optional versions:

- Option 'XO':
Version with integrated low-pass filter (110 Hz) for applications with or without system controller, switchable (XO 'On'/'Off').
- Option 'Outdoor Mobile'
Version for mobile outdoor applications under roofs.
- Option 'Special Colour':
Special finish in RAL colours
- SW 115E - SP:
Version with integrated power amplifier technology
'SP' speakers are shipped with a special user's manual!

2.4 SWi 115E

Short description:

High-performance subwoofer with exponential tunnel geometry, controllable with system controller. 1 15" long-excursion chassis with double centring, bass reflex tuning.

Enclosure:

Frame-reinforced Finnish Multiplex enclosure with highly resistant black (RAL 9005) structured paint. Highly permeable, ball-proof steel grille with exchangeable black acoustic foam. The subwoofer is equipped with 12 concealed M12 threads for 'flown' applications or for mounting devices.

Optional versions:

- Option ,XO':
Version with integrated low-pass filter (110 Hz) for applications with or without system controller, switchable (XO 'On'/'Off').
- Option 'Special Colour':
Special finish in RAL colours.
- SWi 115E - SP:
Version with integrated power amplifier technology
'SP' speakers are shipped with a special user's manual!

2.5 SW 118E

Short description:

High-performance subwoofer for mobile use with exponential tunnel geometry, controllable with system controller. Direct-emitting 18" long excursion chassis, bass reflex tuning.

Enclosure:

Frame-reinforced Finnish Multiplex enclosure with highly resistant black (RAL 9005) structured paint. Highly permeable, ball-proof steel grille with exchangeable black acoustic foam. The subwoofer is equipped with 2 butterfly handles, K&M mounting plate with M20 thread for a distance rod, locking profiles for optional transport cover, 4 'all-safe Jungfalk' flying points for suspension, 4 x 100 mm rear mounted transport castors, non-abrasive plastic stacking feet and corresponding stacking foot grooves for stacks of identical enclosures.

Optional versions:

- Option 'XO':
Version with integrated low pass filter (110 Hz) for applications with or without system controller or signal processor, switchable (XO 'On'/'Off').
- Option ,Outdoor Mobile'
Version for mobile outdoor applications under roofs
- Option 'Special Colour':
Special finish in RAL colours
- SW 118E - SP:
Version with integrated power amplifier technology
'SP' speakers are shipped with a special user's manual!

2.6 SWi 118E

Short description:

High-performance subwoofer for fixed installations with exponential tunnel geometry, controllable with system controller. Direct-radiating 18" long-excursion chassis, bass reflex tuning.

Enclosure:

Frame-reinforced Finnish Multiplex enclosure with highly resistant black (RAL 9005) structured paint. Highly permeable, ball-proof steel grille with exchangeable black acoustic foam. The subwoofer is equipped with 12 concealed M12 threads for 'flown' application or mounting devices.

Optional versions:

- Option 'XO':
Version with integrated low pass filter (110 Hz) for applications with or without system controller or signal processor, switchable (XO 'On'/'Off').
- Option 'Outdoor Installation'
Version for fixed outdoor installations under roofs.
- Option 'Special Colour':
Special finish in RAL colours
- SWi 118E - SP:
Version with integrated power amplifier technology
'SP' speakers are shipped with a special user's manual!

2.7 SW 215E

Short description:

High-performance subwoofer with exponential tunnel geometry, controllable with system controller. 2 double-centred 15" long excursion chassis, bass reflex tuning.

Enclosure:

Frame-reinforced Finnish Multiplex enclosure with highly resistant black (RAL 9005) structured paint. Highly permeable, ball-proof steel grille with exchangeable black acoustic foam. The subwoofer is equipped with 4 butterfly handles, 4 integrated handles, K&M mounting plate with M20 thread for a distance rod, locking profiles for optional transport cover, 4 x 100 mm rear mounted transport castors, 8 non-abrasive plastic stacking feet and corresponding stacking foot grooves for stacks of identical enclosures as well as for stacks and clusters of Line 212 enclosures.

Optional versions:

- Option 'Suspension':
Suspendable version with 6 flying tracks 'allsafe Jungfalk'
- Option 'Outdoor Mobile'
Version for mobile outdoor applications under roofs
- Option 'Special Colour':
Special finish in RAL colours
- SW 215E - SP:
Version with integrated power amplifier technology
'SP' speakers are shipped with a special user's manual!

3. Notes for the 'Outdoor' Option



Speakers with the option 'Outdoor Mobile' and 'Outdoor Installation' have been optimised for outdoor use. They withstand temperature fluctuations in moderate climate zones and do not accumulate condensation water.

In order to guarantee the longevity and safety of the speakers, the speakers with the option 'Outdoor' must still be protected from direct effects of the weather.

They should be installed, for example, under a roof so that they also have sufficient protection from driving rain from the side and direct sunlight.

3.1 'Outdoor Mobile'

Version for mobile outdoor use under roofs.

Features like standard version but with the following extras:

- multi-layered, temperature and UV-resistant high-tech PU marine primer,
- final coating with highly resistant structured 2K paint in RAL colours,
- waterproofed diaphragms and electronic components protected against corrosion with protective coating.

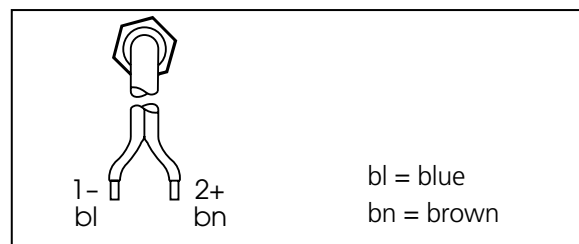
3.2 'Outdoor Installation'

Version for fixed installations under roofs.

Features like standard SWi version combined with 'Outdoor Mobile' but with the following extras:

- stainless steel grille
- acoustic foam behind grille
- visible screws made of stainless steel.
- stainless steel connecting terminal with single PG cable fitting, Ø 13 mm.

Wiring:



4. Notes for the SW112 / SWi 112 with Option '100V'

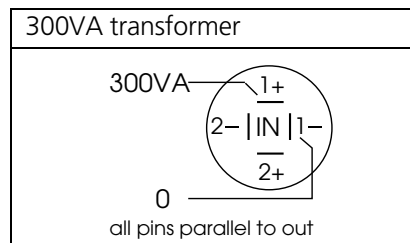
Kling & Freitag speakers with '100V' option are fitted with high-quality toroidal transformers. This serves to minimize loss of sound. Highly professional sound reinforcement results can be achieved by using 100 V Kling & Freitag speakers.

4.1 Reasons for choosing Speakers with 100 V Technology

- Reduction in conduction loss.
- Easy assembly of a loudspeaker network due to simple parallel wiring.
The sum of the output power of the individual speakers (stated as VA = W) must not exceed the output power of the 100 V amplifier.
- Speakers are galvanically isolated.
- Speakers can be integrated into existing 100 V systems.



4.2 Connecting Diagram of the 100V Speaker Inputs



5. Instructions for Suspending the Speakers



Warning

The speakers may only be suspended by trained specialised personnel with proof of their qualifications.

Observe the prescribed safety factors. Follow the safety instructions for speakers and mounting equipment as well as the respective national rules, norms and safety regulations.

Speaker systems, whether single or connected to one another, must always be secured to a second separate point, even if two rigging points are used for suspending the speaker system!

A maximum load of 73 kg may be hung below one SW 215E subwoofer. This means a maximum additional load of 36.5 kg on each flying point.

A maximum load of 50 kg may be suspended from the two flying points of all other subwoofers. This means a maximum additional load of 25 kg on each flying point.

Ensure that all connections are secured to prevent their detaching on their own and that only admissible statically tested and sufficiently sized mounts, connecting devices, ropes and chains are used.

5.1 SW 215E and Click & Fly Accessories

The Click & Fly rigging system is a certified and type tested rigging system for safe and comfortable rigging of SW 215E or Line 112 systems.

Click & Fly Systems with the classification of 'CLICK & FLY RIGGING SYSTEM' may not be used with the SW 215E Systems without the supplementary measures described below.

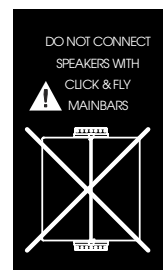
This is necessary due to safety measures for the subwoofer system, which have become additionally necessary. Only when these new supplementary measures are observed can it be guaranteed that you will have a safe and accordingly certified product for your further use.



At this position, 'LINE 212 / SW 215E' must be visible. If 'RIGGING SYSTEM' is present at this position, then the Click & Fly rigging systems is only approved for use with the Line 112 systems.

Supplementary measures which allow for an 'old' Click & Fly rigging system to be used for mounting SW 215E Systems:

- Affix a new name plate, available from Kling & Freitag, recognisable by the classification 'CLICK & FLY LINE 212 / SW 215E'.
- Affix the following additional sticker, received from Kling & Freitag, to the top side of the main bar:



- Receipt of a written version of this manual for each Click & Fly System.
- User's Manual made available for the user.
- Disposal of the old Users' Manual.

Kling & Freitag GmbH has made all resources necessary for supplementation including a detailed manual available free of charge to all buyers of the 'old' 'CLICK & FLY RIGGING SYSTEM'. If you did not receive these resources, please contact your retailer!

5.2 Subwoofers with 'Flying Thread' M12 (SWi Versions)

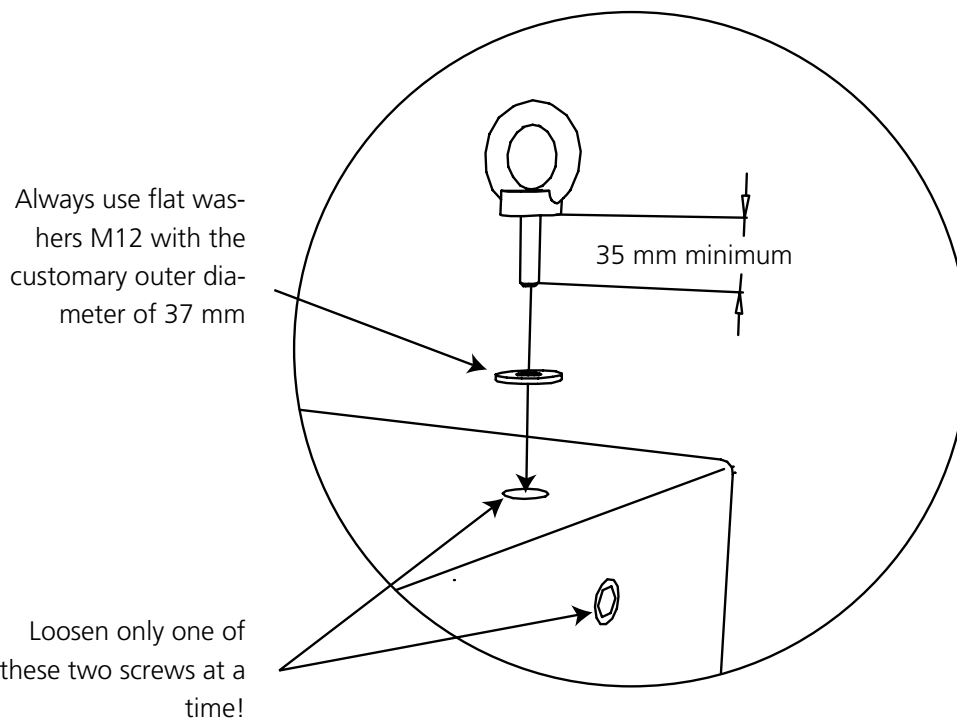
If you want to use the SP subwoofers equipped with 'flying threads' M12, please read the following instructions.

Appropriate fastening mechanisms with an external screw thread of M12 and a minimum length of 35 mm! may be screwed on to the M 12 thread inserts. The internal screw threads in the speaker enclosure are fastened during production with counter-sunk head screws M12.

The two internal screw threads of the inner enclosure edge are on an L-bracket. This L-bracket has the function of connecting the adjoining plates of the enclosure. It provides sufficient tensile strength for flown operations. To guarantee that the enclosure plates are correctly connected by the L-brackets, only one screw of the enclosure edge may be loosened at a time. If both screws of an enclosure edge become loose, then, for safety reasons, the L-bracket will collapse into the enclosure.

If the L-bracket has fallen into the enclosure the loudspeaker must on no account be used again until it has been repaired by an authorized repair service.

When mounting the speakers, use only fastening mechanisms with threads that extend at least 35 mm into the speaker enclosure. Take into account the permissible load capacity of the fastening mechanisms while considering the safety factors. Mount the speakers using at least two independently operating points. Secure all screws to prevent loosening.



5.3 Subwoofers with 'allsafe JUNGFALK' Flying Points



Single Stud Fitting

Used as fastener to the 'allsafe JUNGFALK' flying Point.



'allsafe JUNGFALK' Flying Point

Receptacle for special fasteners.

1.)



Take the single stud fitting in one hand...

2.)



... and push the locking device up against the spring tension.

3.)



Put the flat head of the holding bolt into the guiding of the flying point.

4.)



Release the locking device when the single stud fitting is located in the middle of the flying point. Make sure that the locking device clicks into place.

5.)



Check that the single stud fitting is securely fastened and cannot be pulled out.



Warning

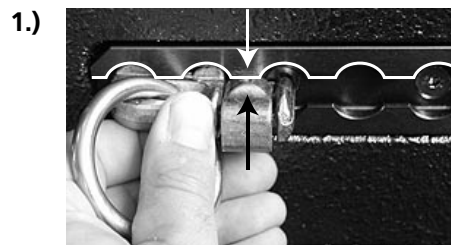
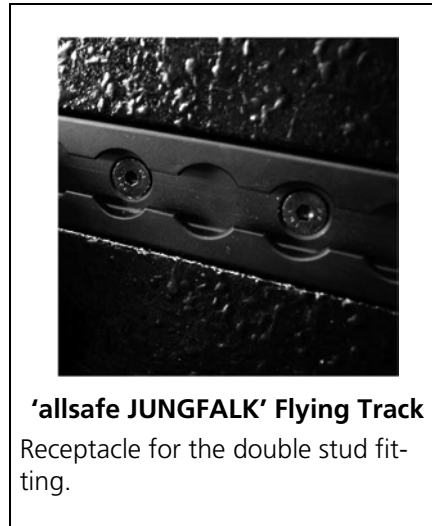
5.4 SW 215E 'Suspension': Using the allsafe Flying Track

The subwoofer SW 215E with suspension option may only be suspended by using the double stud fittings available from Kling & Freitag. The 'allsafe JUNGFALK' flying tracks are used to suspend the SW 215E system.

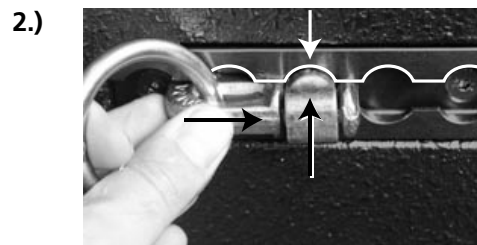
We recommend using the BGV C1 certified Click & Fly Line 212 / SW 215E rigging system for suspending the SW 212E.

The 'allsafe JUNGFALK' flying track can only support weights up to 73 kg on one point!

Please follow the accompanying safety and assembly instructions carefully.



Align the double stud fitting as shown above and push it into the track,...



... slide the pushed double stud fitting to the middle of the speaker until it clicks into place. Make sure that it is secured tightly.



6. Mounting Instructions for Speakers



Mount the speakers securely. To avoid injury or damage, always be sure to mount the speakers securely so that they do not fall. Speakers, which are stacked, must be secured with securing straps. When laying the connecting cables, make sure that nobody can trip.

The stability of stacked systems (also valid for the use of stands and distance rods!) is contingent upon the following stability requirement. These conditions must, therefore, be guaranteed by the user:

Stacked systems may not fall over even if they are inclined by 10° in each direction. If this requirement is not fulfilled, then it is necessary to take steps to achieve compliance. Possible measures include strapping it to an appropriate base structure or fastening it using safety straps.

6.1 Using the Mounting Equipment 'Distance Rod'

The subwoofer is equipped with a threaded flange (M20) on the top of the enclosure for mounting the optionally available distance rod (not on the SWi versions).

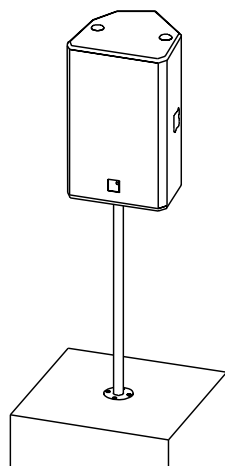
All K&F top speakers with a mounting flange or stand adapter may be mounted on the distance rod. Only use authentic Kling & Freitag distance rods and stand adapters. We can only guarantee safe operations when these parts are used.

When a top speaker is mounted on the subwoofer using a distance rod, the stability of the speakers is reduced. Please follow the stability requirements in chapter 6!

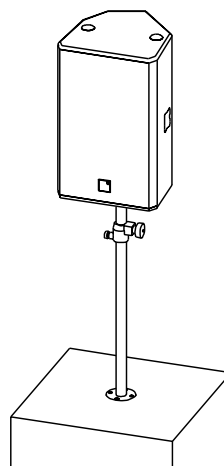
When re-positioning after set-up, remove the upper speaker mounted on the distance rod first.

Special note for the model SW 112

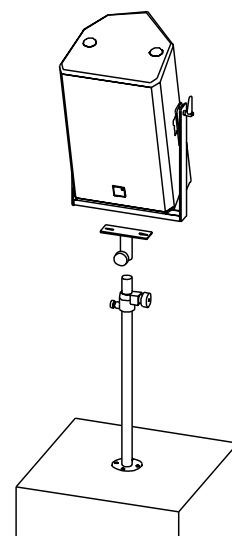
A top speaker with a maximum weight of 28 kg (i.e. CA 1201) may be mounted on this speaker using a distance rod. Speakers, which are heavier than 28 kg, may not be mounted on the distance rod flange and must be mounted on an additional speaker stand.



Distance rod 334



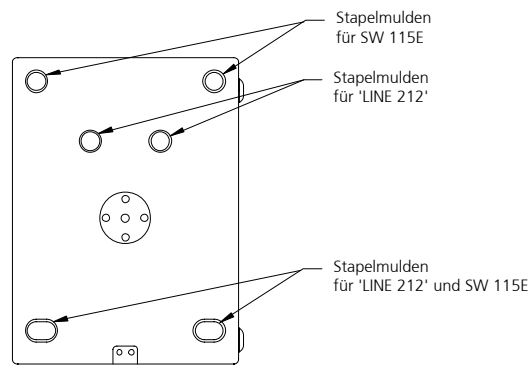
Distance rod 337
(adjustable)



Distance rod 337
with stand adapter and
adjustable speaker mount

6.2 LINE 212 Systems on Top of SW 115E

In addition to the stacking foot grooves for stacking the same enclosures, the subwoofer SW 115E also has stacking foot grooves for the Line 212 system. One Line 212 System can be quickly and safely positioned on top of the subwoofer.

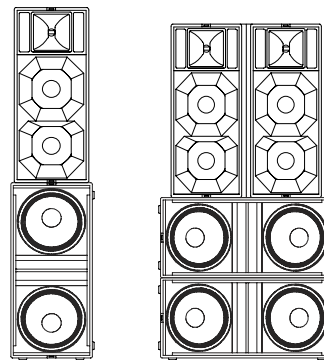


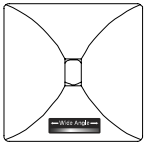
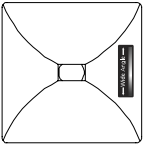
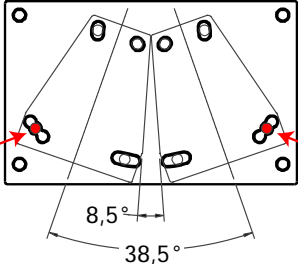
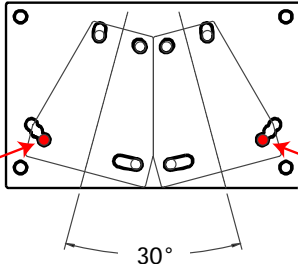
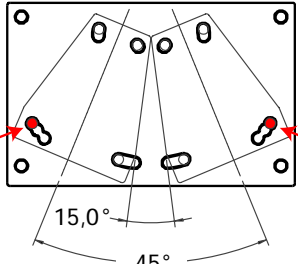
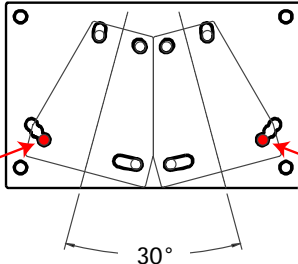
6.3 LINE 212 Systems on Top of SW 215E

In addition to the stacking foot grooves for stacking the same enclosures, the subwoofer SW 215E also has stacking foot grooves for the Line 212 system.

One Line 212 System can be quickly and safely positioned on top of a vertically placed SW 215E.

Two Line 212 systems can be precisely arrayed on top of a horizontally placed SW 215E.



	 Horn not rotated on standing Line 212 system	 Horn rotated on standing Line 212 system
Line 212-6 – SP with Line 212-6 – SP		
Line 212-6 – SP with Line 212-9 – SP		

Other combinations of Line 212 Systems are not recommended as they can cause unwanted interferences. .

7. Short Circuit Fuses in the K&F Subwoofer Systems

7.1 Risks of using High Performance Power Amplifiers

In recent years, power amplifiers have achieved increasingly higher levels of performance. Some of them can be operated with low-impedance loads. There are, therefore, strong power amplifiers that can reliably work with impedances below 1 Ω . This development has led to an increased safety risk during defective operations.

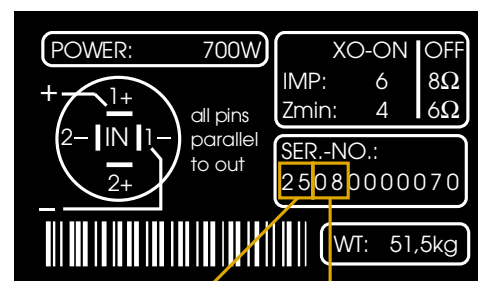
When there is a defect, such as a short circuit in the speaker chassis or on the crossover, it is possible that the power amplifier – despite existing protective switches – will not shut off. Long cable lengths and contact resistance on the plug connections may already have an electrical resistance of 1 Ω . As a result, the power amplifier cannot “recognise” the operations as being defective and, therefore, delivers unacceptable high currents. In the worst-case scenario, this may lead to fire damage (hot and charred wiring / connectors as a result of overloaded conductors and connectors, etc.). *The current safety regulations are lagging behind this development and are thus not up-to-date with this modern technology.*

In order to give consideration to this development, Kling & Freitag now equips its subwoofer systems with short circuit fuses at the signal input. These fuses do not offer protection for the speaker, but do reduce the risk of consequential damage in the case of a short circuit.

For systems, which are not serially equipped with a short circuit fuse, Kling & Freitag offers simple add-on kits so that you can adapt your existing subwoofer systems to the current power amplifier development.

7.2 Identifying the Models with Short Circuit Fuses

The subwoofer systems, which are serially equipped with, fire safety fuses can be identified as follows; both mentioned stipulations must be fulfilled:



The first two digits must be at least 25.

The next two digits must be at least 08.

All subwoofer systems, which are not serially equipped with short circuit fuses, can be, if required, easily and inexpensively upgraded even by yourself.

An instruction manual for this upgrade is delivered with the add-on kit.

7.3 Specification of the Fuses

The fuses in all models have the following identical specifications:

Bussmann S 506-8A slow

When necessary, these fuses may only be replaced with the aforementioned original fuse.

7.4 Replacement and Positions of the Short Circuit Fuses

When the fuse is burned out, then the chassis is most likely already ruined, as the fuse just prevents consequential damage resulting from a short circuit of the chassis. A disassembly of the chassis is, therefore, unavoidable.

7.4.1 Subwoofers without Crossover (XO)

The fuse holder of the subwoofers without a crossover (XO) is mounted on the signal wiring behind the input connector. The subwoofers with two chassis have 2 fuses because the chassis are intended for parallel use.

When replacing the fuse, the chassis must be removed in order to reach the fuse holder. Unscrewing the connecting terminal does not enable you to reach the fuse holder.

When the chassis is re-assembled, first loosely fasten the screws diagonal from one another, then tighten them. By tightening the screws diagonally in two steps, a deformation of the chassis and thus a possible de-centring of the voice coil can be avoided.

7.4.2 Subwoofers with Crossover (XO)

The fuses of the subwoofers with a crossover are serially mounted on the crossover. The exact position is described in the chapter 'Internal Wiring of Subwoofers with Low-Pass Filter (XO)' beginning on page 27 for the particular models.

If it happens to be a model, which has already been upgraded, then the fuse holder is mounted on the signal wiring behind the input connector.

When replacing the fuse in both cases, the chassis must be removed in order to reach the fuse holder. Unscrewing the connecting terminal does not enable you to reach the fuse holder.

When the chassis is re-assembled, first loosely fasten the screws diagonal from one another, then tighten them. By tightening the screws diagonally in two steps, a deformation of the chassis and thus a possible de-centring of the voice coil can be avoided.

7.5 Add-On Kits for Subwoofers without Short Circuit Fuses

All subwoofer systems, which are not serially equipped with short circuit fuses, can be, if required, easily and inexpensively upgraded even by yourself.

An instruction manual for this upgrade is delivered with the add-on kit.

Subwoofers with a crossover that are not serially equipped with short circuit fuses can also be, if necessary, upgraded with fire safety fuses. The crossover does not need to be replaced. For this, we offer an add-on kit that is mounted between the crossover input and the input connector.

8. Wiring

The Speaker is equipped with two parallel-wired Speakon connectors.

Before connecting your speaker as shown in chapter 9 be sure to switch off all connected appliances and turn down all level controls.

- We recommend the use of high-quality speaker cables provided by KLING & FREITAG.
- For connections from the mixing console to the power amplifier inputs, please use 2-pin shielded microphone cable with high-quality connectors.
- Avoid ground loops (see chapter 8.2 **Avoiding Ground Loops**)
- Please pay attention to the respective pin diagrams in this manual!
- Make sure that the +/- polarity between speaker and amplifier is correct. When simultaneously using power amplifiers from different manufacturers, be sure to use the correct specific pin configuration. It may be necessary to modify the pin configuration on the power amplifiers or on the connectors leading to them.
- To avoid loss of power, the cables should have a minimum wire gauge of 2.5 mm² - more for longer cabled distances. A minimum wire gauge can be easily calculated with the following formula:

$$\text{minimum wire gauge (mm}^2\text{)} = \frac{\text{required cable length (m)}}{2 \times \text{speaker's impedance (}\Omega\text{)}}$$

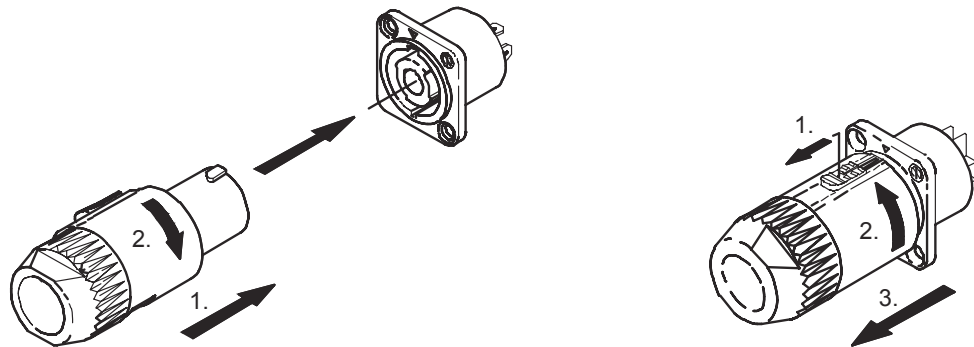
If several loudspeakers are to be connected, the signal can be linked through from one loudspeaker to the next. Please make sure that the total impedance of the loudspeakers $R(\Omega)$ is not lower than the minimal impedance indicated on the power amplifier.

$$1/R_1 + 1/R_2 + 1/R_3 + \dots = 1/R_{\text{total}}$$



Important

8.1 Connecting the Speakon Connectors to the Connecting Terminal



8.2 Avoiding Ground Loops

8.2.1 What is a Ground Loop?

Every component of a P.A. or Hi-Fi System has its own internal 0V reference (ground). This point is often connected to the protective earth connector (PE / Ground). If two or more units are connected to one another with a line level audio cable, there may be a ground connection through the ground of the power supply cable (yellow-green) as well as through the shielding of the audio cable. The voltage difference between these two ground points causes audible interference to come from the speaker.

8.2.2 Avoiding Ground Loops

If there is a loud humming or buzzing after the speaker has been connected, then check that a 'ground loop' has not been built into the system. Some power amplifiers and system controllers facilitate a ground lift switch. Set these ground lift switches to the 'Lift' position one after the other. If the noise is still audible, check if,

1. the noise is caused by a ground loop before the power amplifiers or controllers (e.g. mixing console, effects or equalizers).
2. the system or parts of the system are connected to an 'unclean' power supply - meaning one which is also running large motors or lighting systems. An 'unclean' supply voltage, electrostatic and electromagnetic fields can cause interference.

Please observe the following basic rules:

- **Never!!! try to avoid a ground loop by disconnecting or taping the protective earth contact at the mains connector! Extremely dangerous! Extremely dangerous!**
- If possible, only use high-quality audio appliances with balanced signal outputs and with power cables with PE connectors.
- Use high-quality cables with good shielding.
- The point of ground for all connected components should merge at one central point. The power connections should lead out in a radial manner from one point and not be linked from one unit to the next.
- When installing appliances that create strong electrostatic or electromagnetic fields (large transformers, switch-mode power supplies), maintain some distance from other audio appliances. In extreme cases, the only solution is to create a completely independent 'audio ground'; in other cases, it is sufficient to connect a filter in front of the audio equipment.



9. Configurations and Connecting Diagrams

9.1 Operating the Systems without C2 Controller

The K&F subwoofers with integrated crossover (SW 112 - XO / SW 115D - XO or SW 118E - XO) can be combined with K&F top speakers by simply connecting them in parallel.



9.1.1 'XO ON' Subwoofer with optional Crossover (XO)

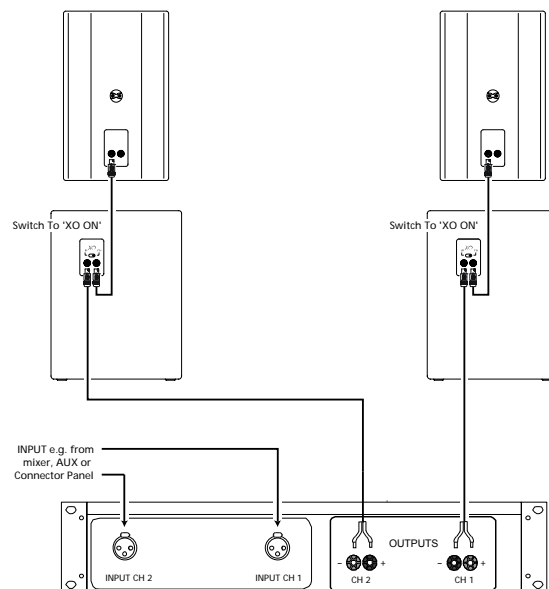
In this mode of operation you can easily realise applications, where a higher bass level is needed.

Be sure to use only amplifiers, which can handle speaker impedances down to 3 Ω in this mode.

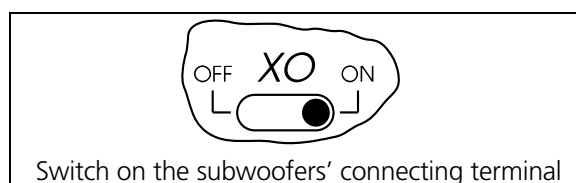
When using the mid-high systems in a cluster (speakers in close proximity), reduce the frequencies below 300 Hz by 3-4 dB!

Recommended combinations of CA systems, as described here, with K&F subwoofers:

2 CA systems	+	2- 4 x SW 112-XO
	or +	2 x SW 115E-XO
	or +	1 - 2 x SW 118E-XO



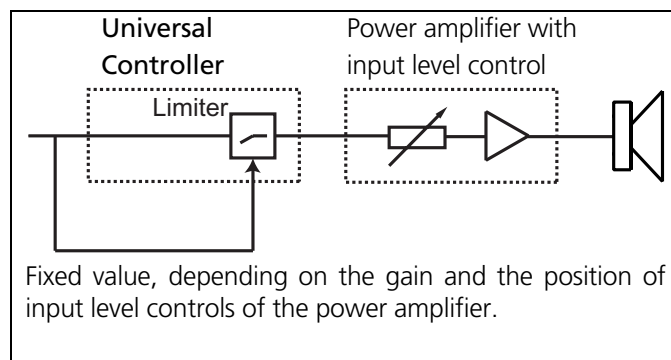
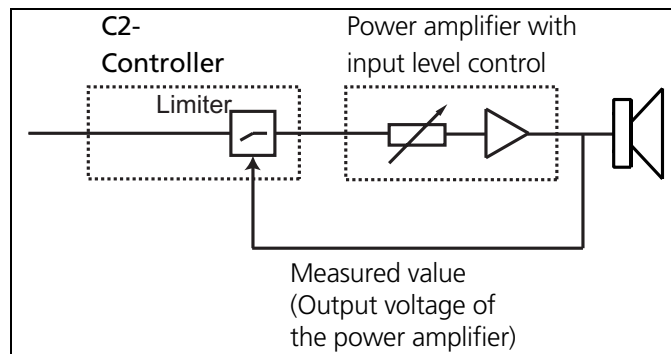
The switch XO on the connecting terminal of the subwoofer must be at 'ON' for this mode of operation:



9.2 Operations with C2 Controller

The C2 Controller optimises the operating safety of speakers and power amplifiers through special peak and RMS limiters with sense technology:

With other (universal) controllers, the gain of the selected power amplifiers must be known. The limiter on the C2 Controller, on the other hand, uses a special control circuit to determine the actual output voltage of the power amplifiers. The limiter then reduces the input level only when the power amplifier actually provides more power than the speakers can handle. The amplifier's gain and the position of the input level control for the power amplifiers are insignificant for the limiter function of the C2 Controller.



Additional features of the C2 Controller

The use of carefully adjusted filters (EQ) on the system plug-in cards enables the C2 Controller to optimise the feedback stability and the frequency response of the speakers.

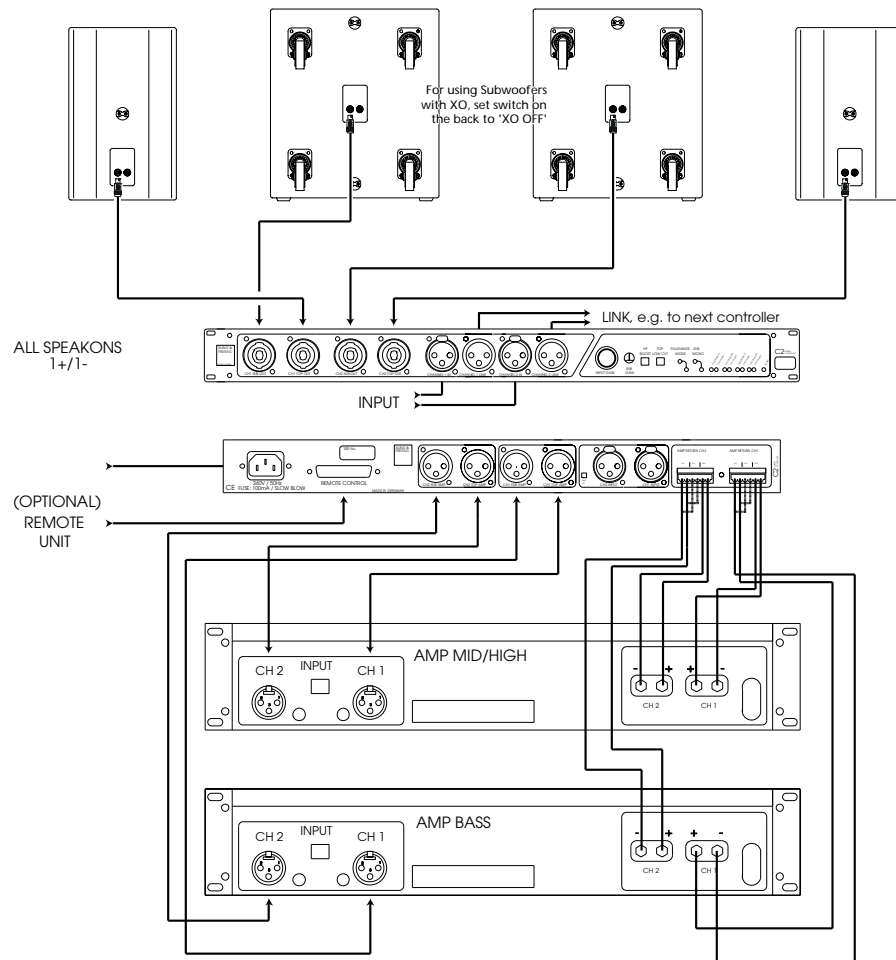
It provides a level alignment for the bass speakers and a sub-mono function.

The following functions are available for the top speakers:

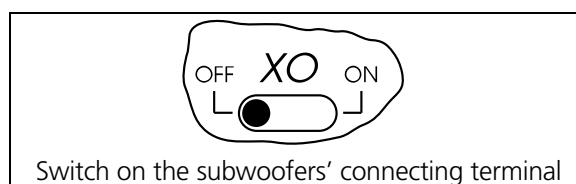
- optional bass-boost in full-range mode
- optimisation for clustered applications ('Top Low Cut' switch)
- high-boost for larger distances

9.2.1 'XO OFF' or Subwoofers without optional Crossover

Operations with Controller C2 in 2-way active mode



The switch XO on the connecting terminal of the subwoofer must be at XO 'OFF' for this mode of operation:



The countersunk switch 'Full-Range Mode' on the C2 Controller should not be pressed and the LED assigned to it should not light up.

If you are using the mid-high systems in a cluster (speakers in close proximity), press the 'Top Low Cut' switch on the C2 Controller.

Advantages of the active mod:

- Possibility to separately adjust the level of the subwoofer.
- The mid-high systems do not receive any low-frequency signals and are not as strained.
- Higher achievable total sound power level.
- While taking the various mid-high systems, the frequency response of the system can be optimised application-specifically.
- The C2 Controller optimises the operating safety through special limiters.

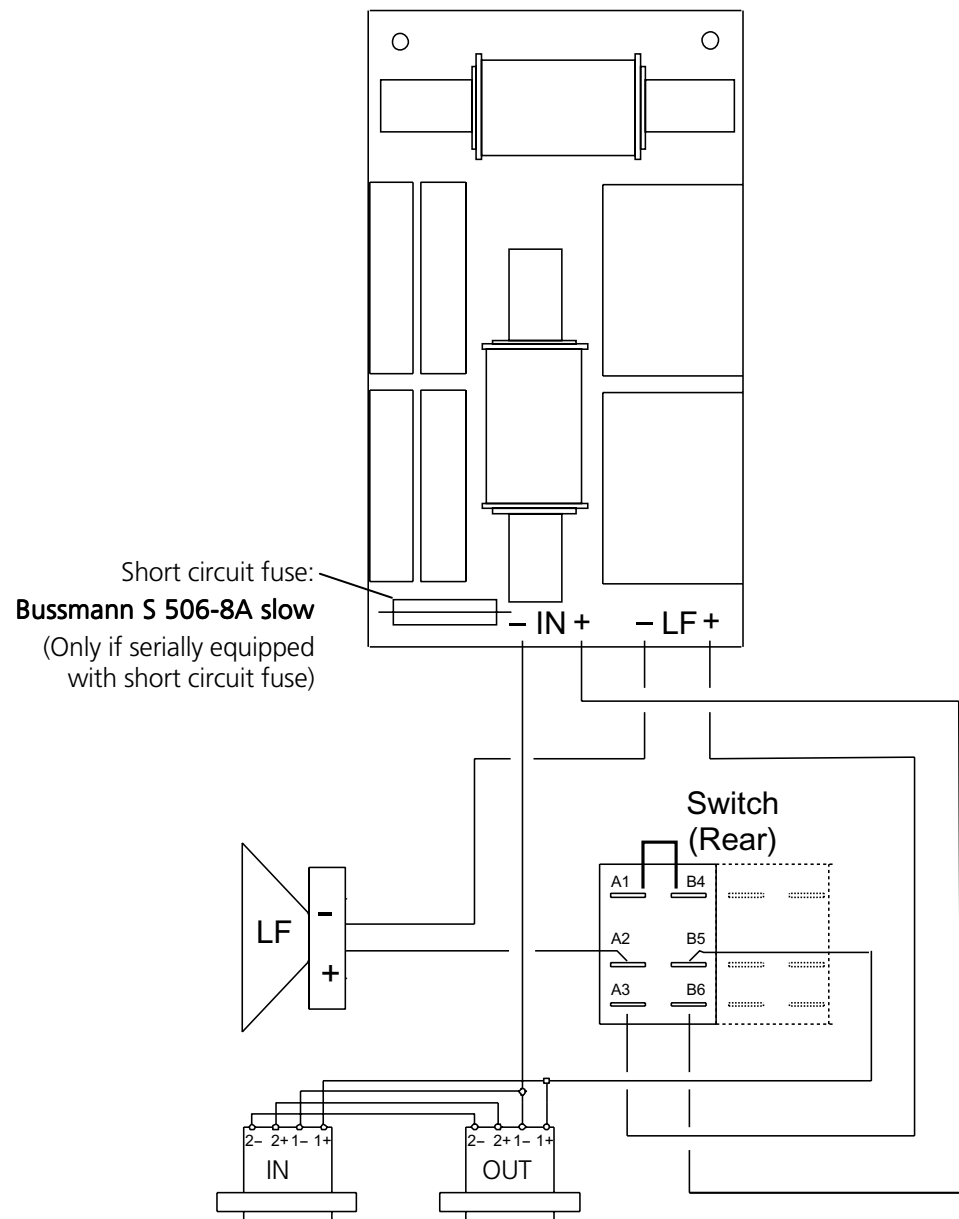
10. Operating the Speakers

- Switch off all equipment and turn down all level controls.
- Connect your subwoofers in accordance with preceding connection diagrams.
- Please pay attention to the user's manual of your power amplifier!
- Upon completing the wiring, ensure that the connected speakers are working in phase. To do so, use i.e. a phase checker. A phase error can also be recognized when the connected channels are used simultaneously. During simultaneous use the bass frequencies become notably quieter or the mid-frequencies such as voices cannot be located.
- Now switch on the peripheral equipment first (mixing console, effects etc.), followed by the C2 Controller and lastly the power amplifiers. Always use the before mentioned switching order. Otherwise switching noises may damage the system.
- If there is interference, turn off all appliances in the reverse order and check all cable connections (see chapter 8.2 , Avoiding Ground Loops).
- Next, turn on the C2 Controller, if used, and the other peripheral equipment and make sure there is no interference.
- Now put a low level signal into the system and check for the correct function of the system. In doing so, all amplifier input controls need to be turned down again. Now turn on the amplifier's level control for the left CA system and check that the correct signal is coming out of the top speaker.
- For operations with C2 Controller: The 'Sense' LED for the top speaker (i.e. CH 1 TOP signal) of the K&F C2 Controller will light up green at a level of at ca. -40dB. The other channels of the system are checked in the same way. If the wrong LED lights up or a wrong (i.e., in 2-way active mode, low-signal from a high frequency speaker) or distorted signal occurs, then there is a mistake in the wiring.



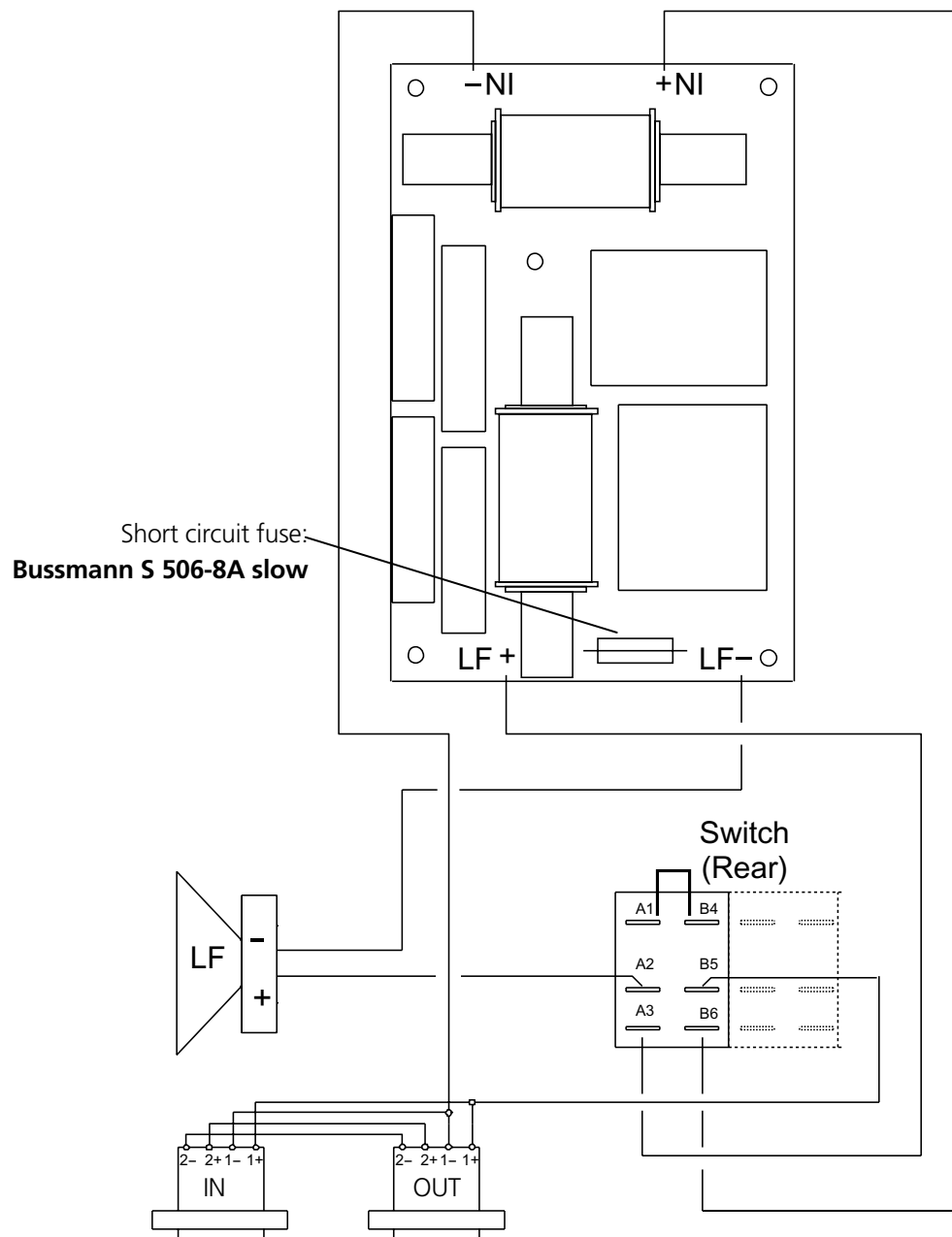
11. Internal Wiring of Subwoofers with Low-Pass Filter (XO)

11.1 SW 112 - XO / SW 118E - XO



Pin assignment Speakon NL4				
	+	-	/	/
'IN'	1+	1-	2+	2-
'OUT'	parallel with 'IN'			

11.2 SW 115E - XO



Pin assignment Speakon NL4				
	+	-	/	/
'IN'	1+	1-	2+	2-
'OUT'	parallel with 'IN'			

12. Touching Up Damage to Paint / Changing the Front Foam

Although the PU structured paint used by KLING & FREITAG is extremely resistant, we recommend using protective covers or cases to help avoid damaging the paint during i.e. continuous mobile use. If paint damage occurs despite these precautions, it can be touched up by using commercial acrylic paint in the appropriate RAL colour of the speaker. To replace the filter foam, send the front grille incl. foam to KLING & FREITAG GmbH. Upon payment for expenses, the grille with the new covering will be returned.

13. Technical Specifications

13.1 SW 112

Speaker	
Design	Bass reflex system with exponential tunnel geometry
Frequency range -10 dB	35 Hz – 2.5 kHz
Frequency range ± 3 dB	41 Hz - 350 Hz
Crossover frequencies	max. 110 Hz with optional low-pass filter (XO 'ON')
Power handling	500 W nominal ¹⁾ 1000 W programme ²⁾
Sensitivity 1 W / 1 m	92 dB (45 Hz - 350 Hz) ³⁾ 93 dB (40 Hz - 110 Hz) with optional low-pass filter (XO 'ON')
Max. SPL	124 dB (peak / 1 m / free field, equivalent 130 dB half room)
Components	1 x 12" long excursion chassis, 100 mm voice coil, internal and external ventilation
Impedance (nom.) XO 'ON'	6 Ω , Zmin. 4 Ω
Without crossover, XO 'OFF'	8 Ω , Zmin. 6 Ω
Connectors	2 x Speakon NL4MP (1+/1-)
Enclosure	
	15 mm frame reinforced Multiplex plywood with highly resistant black structured paint (PU)
	1 ergonomic handle
	K&M mounting plate M20 for distance rod, 4 non-abrasive plastic feet, stacking foot grooves for stacks of identical enclosures
	ball-proof steel grille with exchangeable black acoustic foam
Dimensions (W x H x T)	470 x 370 x 520 mm
Weight	27 kg / 28.7 kg with low-pass filter
Options	'XO' switchable low-pass filter, 'terminal clamp' instead of Speakon connector, '100 Volt' with 300 VA toroidal transformer (29.5 kg) – not in combination with option 'XO' 'Suspension' with 6 flying points 'allsafe JUNGFALK' 'Outdoor Mobile' Special finish in RAL colours
Accessories	see catalogue or visit www.kling-freitag.de

1) Pink noise 40 – 400 Hz, 2 h; 2) as 1) but with 50% duty cycle; 3) 2.83 Vrms free field

13.2 SWi 112

Speaker	
Design	Bass reflex system with exponential tunnel geometry
Frequency range -10 dB	35 Hz – 2.5 kHz
Frequency range ± 3 dB	41 Hz - 350 Hz
Crossover frequencies	110 Hz with optional low-pass filter (XO 'ON')
Power handling	500 W nominal ¹⁾ 1000 W programme ²⁾
Sensitivity 1 W / 1 m	92 dB (45 Hz - 350 Hz) ³⁾
Max. SPL	124 dB (SPL Peak / 1 m / free field, equivalent 130 dB half room)
Components	12" long excursion chassis, 100 mm voice coil, internal and external ventilation
Impedance (nominal)	6 Ω , Zmin. 4 Ω (XO 'ON') 8 Ω , Zmin. 6 Ω (XO 'OFF')
Connectors	2 x Speakon NL4MP (1+/1-)
Enclosure	
	15 mm frame reinforced Multiplex plywood with highly resistant black structured paint (PU)
	ball-proof steel grille with exchangeable black acoustic foam
Rigging	12 x M 12 thread inserts
Dimensions (W x H x D)	470 x 370 x 520 mm (incl. castors)
Weight	27 kg
Options	'XO' switchable low-pass filter, 'terminal clamp' instead of Speakon connector, '100 Volt' with 300 VA toroidal transformer (29.5 kg) - not in combination with option 'XO' 'Special finish in RAL colours'
Accessories	see catalogue or visit www.kling-freitag.de

1) Pink noise 40 – 400 Hz, 2 h; 2) as 1) but with 50% duty cycle; 3) 2.83 Vrms free field

13.3 SW 115E

Speaker	
Design	Bass reflex system with exponential tunnel geometry
Frequency range -10 dB	37 Hz - 320 Hz
Frequency range ± 3 dB	43 Hz - 150 Hz
Power handling	750 W nominal ¹⁾ 1500 W programme ²⁾
Sensitivity 1 W / 1 m	95 dB (37 Hz - 320 Hz) ³⁾
Max. SPL	127 dB (SPL Peak / 1 m free field, equivalent 133 dB half room)
Components	15" long excursion chassis, double centred 100 mm voice coil, internal and external ventilation, Aluminium demodulation ring for minimal distortions
Impedance (nominal)	8 Ω , Zmin. 6,2 Ω (XO 'OFF' or without filter) 6 Ω , Zmin. 4.5 Ω (XO 'ON')
Connectors	2 x Speakon NL4MP (1+/1-)
Enclosure	
	15 mm frame reinforced Multiplex plywood with highly resistant black structured paint (PU), 2 ergonomic butterfly handles, K&M mounting plate M20 for distance rod, 4 non-abrasive plastic sliders, stacking foot grooves for stacks of identical enclosures or SW 215E as well as Line 212, 2 locking profiles for optional transport cover, ball-proof steel grille with exchangeable black acoustic foam
Dimensions (W x H x D)	470 x 515 x 640 mm
Weight	35 kg / 37 kg with option 'XO'
Options	'XO' with switchable low-pass filter, Crossover frequency at 110 Hz, 'barrier strip' instead of speakon connector, 'Outdoor Mobile', 'Special finish in RAL colours'
Accessories	see catalogue or visit www.kling-freitag.de

1) Pink noise 40 – 400 Hz, 2 h; 2) as 1) but with 50% duty cycle; 3) 2.83 Vrms free field

13.4 SWi 115E

Speaker	
Design	Bass reflex system with exponential tunnel geometry
Frequency range -10 dB	37 Hz - 320 Hz
Frequency range ± 3 dB	43 Hz - 150 Hz
Power handling	750 W nominal ¹⁾ 1500 W programme ²⁾
Sensitivity 1 W / 1 m	95 dB (37 Hz - 320 Hz) ³⁾
Max. SPL	127 dB (SPL Peak / 1 m free field, equivalent 133 dB half room)
Components	15" long excursion chassis, double centred 100 mm voice coil, internal and external ventilation, Aluminium demodulation ring for minimal distortions
Impedance (nominal)	8 Ω , Zmin. 6,2 Ω (XO 'OFF' or without filter) 6 Ω , Zmin. 4,5 Ω (XO 'ON')
Connectors	2 x Speakon NL4MP (1+/1-)
Enclosure	
	15 mm frame reinforced Multiplex plywood with highly resistant black structured paint (PU) ball-proof steel grille with exchangeable black acoustic foam
Rigging	12 x M12 thread inserts
Dimensions (W x H x D)	470 x 504 x 640 mm
Weight	35.3 kg / 37.3 kg with option 'XO'
Options	'XO' switchable low-pass filter, crossover frequency at 110 Hz 'barrier strip' instead of speakon connector, 'Special finish in RAL colours'
Accessories	see catalogue or visit www.kling-freitag.de

1) Pink noise 40 – 400 Hz, 2 h; 2) as 1) but with 50% duty cycle; 3) 2.83 Vrms free field

13.5 SW 118E

Speaker	
Design	Bass reflex system with exponential tunnel geometry
Frequency range -10 dB	30 Hz – 2.5 kHz
Frequency range ± 3 dB	38 Hz - 300 Hz
Crossover frequencies	110 Hz with optional low-pass filter (XO 'ON')
Power handling	700 W nominal ¹⁾ 1400 W programme ²⁾
Sensitivity 1 W / 1 m	97 dB (40 Hz - 300 Hz) ³⁾
Max. SPL	134 dB (SPL peak / 1 m / free field, equivalent 140 dB half room)
Components	18" long excursion chassis, double centred 100 mm voice coil, internal and external ventilation, demodulation ring (double DDR) for minimised distortions
Impedance (nom.) XO 'ON'	6 Ω , Zmin. 4 Ω
without filter or XO 'OFF'	8 Ω , Zmin. 6 Ω
Connectors	2 x Speakon NL4MP (1+/1-)
Enclosure	
	15 mm frame reinforced Multiplex plywood with highly resistant black structured paint (PU)
	4 ergonomic butterfly handles, K&M mounting plate M20 for distance rod,
	4 non-abrasive plastic feet, 4 stacking foot grooves for stacks of identical enclosures,
	2 locking profiles for optional transport cover ball-proof steel grille with exchangeable black acoustic foam
Rigging	4 flying points 'allsafe JUNGFALK'
Dimensions (W x H x D)	600 x 680 x 766 mm (incl. castors)
Weight	49.8 kg
Options	'XO' with switchable low-pass filter, 'terminal clamp' instead of Speakon connector, 'without 100 mm transport castors', 'Outdoor Mobile', 'Special finish in RAL colours'
Accessories	see catalogue or visit www.kling-freitag.de

1) Pink noise 40 – 400 Hz, 2 h; 2) as 1) but with 50% duty cycle; 3) 2.83 Vrms free field

13.6 SWi 118E

Speaker	
Design	Bass reflex system with exponential tunnel geometry
Frequency range -10 dB	30 Hz – 2.5 kHz
Frequency range ± 3 dB	38 Hz - 300 Hz
Crossover frequencies	110 Hz with optional low-pass filter (XO 'ON')
Power handling	700 W nominal ¹⁾ 1400 W programme ²⁾
Sensitivity 1 W / 1 m	97 dB (40 Hz - 300 Hz) ³⁾
Max. SPL	134 dB (SPL peak / 1 m / free field, equivalent 140 dB half room)
Components	18" long excursion chassis, double centred 100 mm voice coil, internal and external ventilation, demodulation ring (double DDR) for minimised distortions
Impedance (nom.) XO 'ON'	6 Ω , Zmin. 4 Ω
without filter or XO 'OFF'	8 Ω , Zmin. 6 Ω
Connectors	2 x Speakon NL4MP (1+/1-)
Enclosure	
	15 mm frame reinforced Multiplex plywood with highly resistant black structured paint (PU) ball-proof steel grille with exchangeable black acoustic foam
Rigging	12 x M 12 thread inserts
Dimensions (W x H x D)	600 x 672 x 640 mm
Weight	46.2 kg
Options	'XO' switchable low-pass filter, 'terminal clamp' instead of Speakon connector, 'Outdoor Installation', 'Special finish in RAL colours'
Accessories	see catalogue or visit www.kling-freitag.de

1) Pink noise 40 – 400 Hz, 2 h; 2) as 1) but with 50% duty cycle; 3) 2.83 Vrms free field

13.7 SW 215E

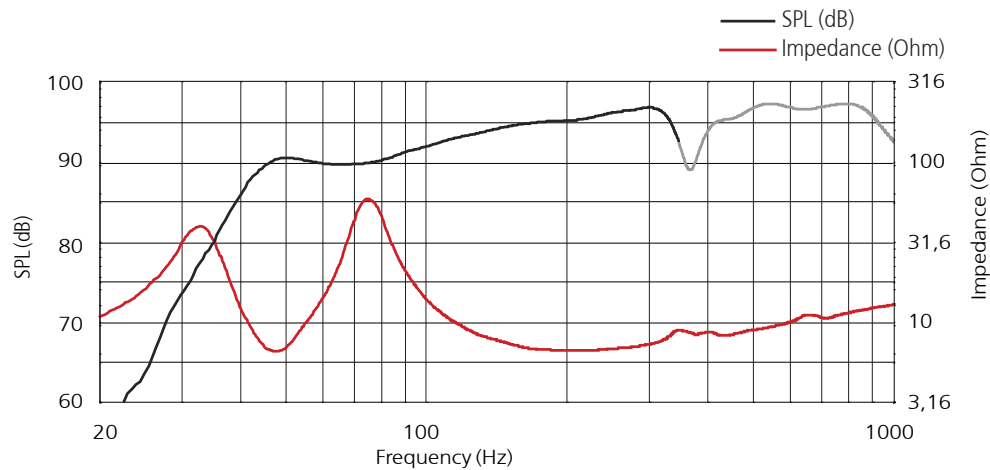
Speaker	
Design	Bass reflex system with exponential tunnel geometry
Frequency range -10 dB	36 Hz - 1 kHz
Frequency range ± 3 dB	42 Hz - 250 Hz
Crossover frequencies	max. 200 Hz
Power handling	1500 W nominal ¹⁾ 3000 W programme ²⁾
Sensitivity 1 W / 1 m	98 dB (42 Hz - 150 Hz) ³⁾
Max. SPL	133 dB (peak / 1 m / free field, equivalent 139 dB half room)
Components	2 x 15" long excursion chassis, 100 mm voice coil with double centring internal and external ventilation
Impedance (nominal)	Demodulation ring (double DDR) for minimal distortions
Connectors	4 Ω , Zmin. 3.1 Ω 2 x Speakon NL4MP (1+/1-)
Enclosure	
	15 mm frame reinforced Multiplex plywood with highly resistable black structured paint (PU)
	4 ergonomic butterfly handles, 4 integrated handles, K&M mounting plate M20 for distance rod, 8 non-abrasive plastic feet, stacking foot grooves for stacks of identical enclosures as well as for single or clustered Line 212 enclosures
	4 x 100 mm rear mounted castors, 2 locking profiles for optional transport cover, ball-proof steel grille with exchangeable black acoustic foam
Dimensions (W x H x D)	480 x 1015 x 765 mm (incl. castors)
Weight	68.5 kg
Options	'terminal clamp' instead of Speakon connector, 'without 100 mm transport castors', 'Suspension' with 6 flying tracks 'allsafe JUNGFALK', 'Outdoor Mobile', 'Special finish in RAL colours'
Accessories	see catalogue or visit www.kling-freitag.de

1) Pink noise 40 – 400 Hz, 2 h; 2) as 1) but with 50% duty cycle; 3) 2.83 Vrms free field

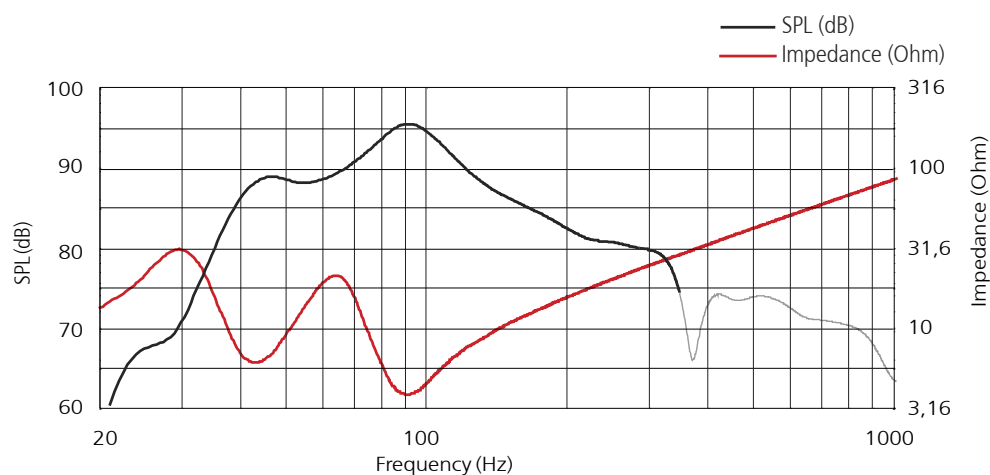
14. Frequency Diagrams

14.1 SW 112 / SWi 112

14.1.1 Without optional Low-Pass Filter or 'XO OFF'

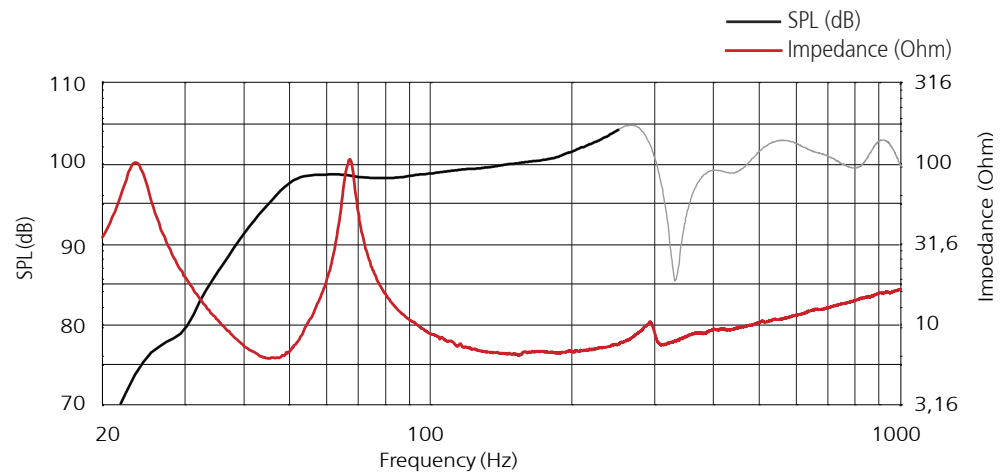


14.1.2 With optional Low-Pass Filter 'XO ON'

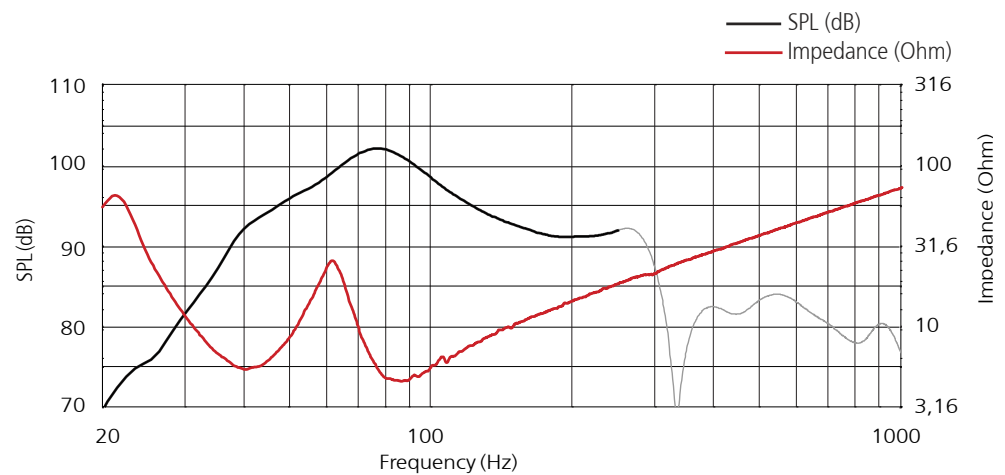


14.2 SW 115E / SWi 115E

14.2.1 Without optional Low-Pass Filter or 'XO OFF'

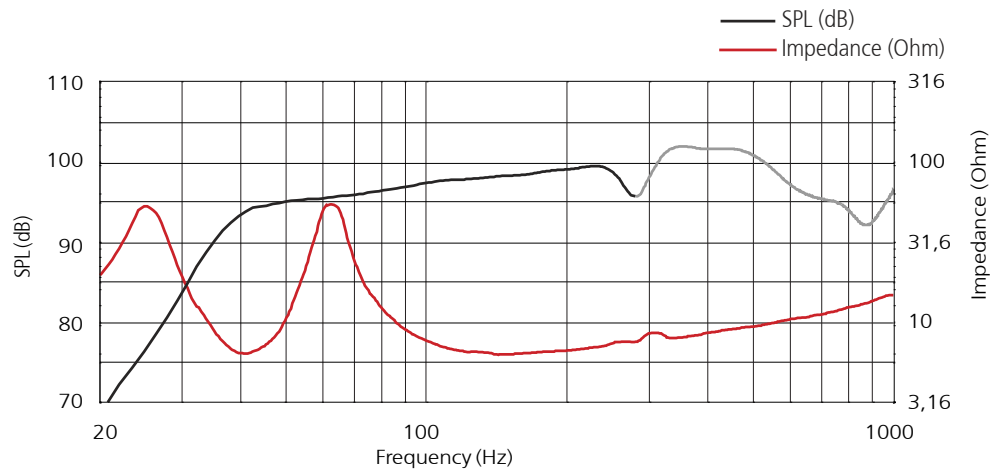


14.2.2 With optional Low-Pass Filter 'XO ON'

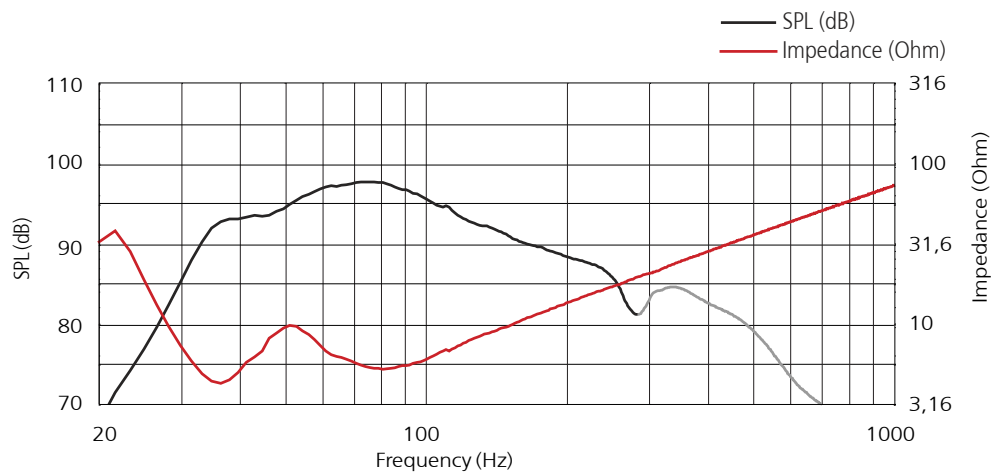


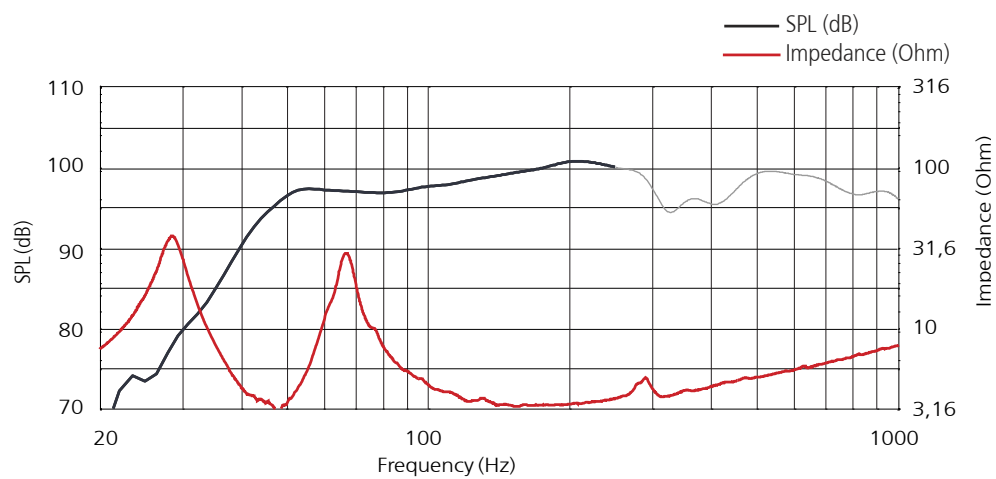
14.3 SW 118E / SWi 118E

14.3.1 Without optional Low-Pass Filter or 'XO OFF'



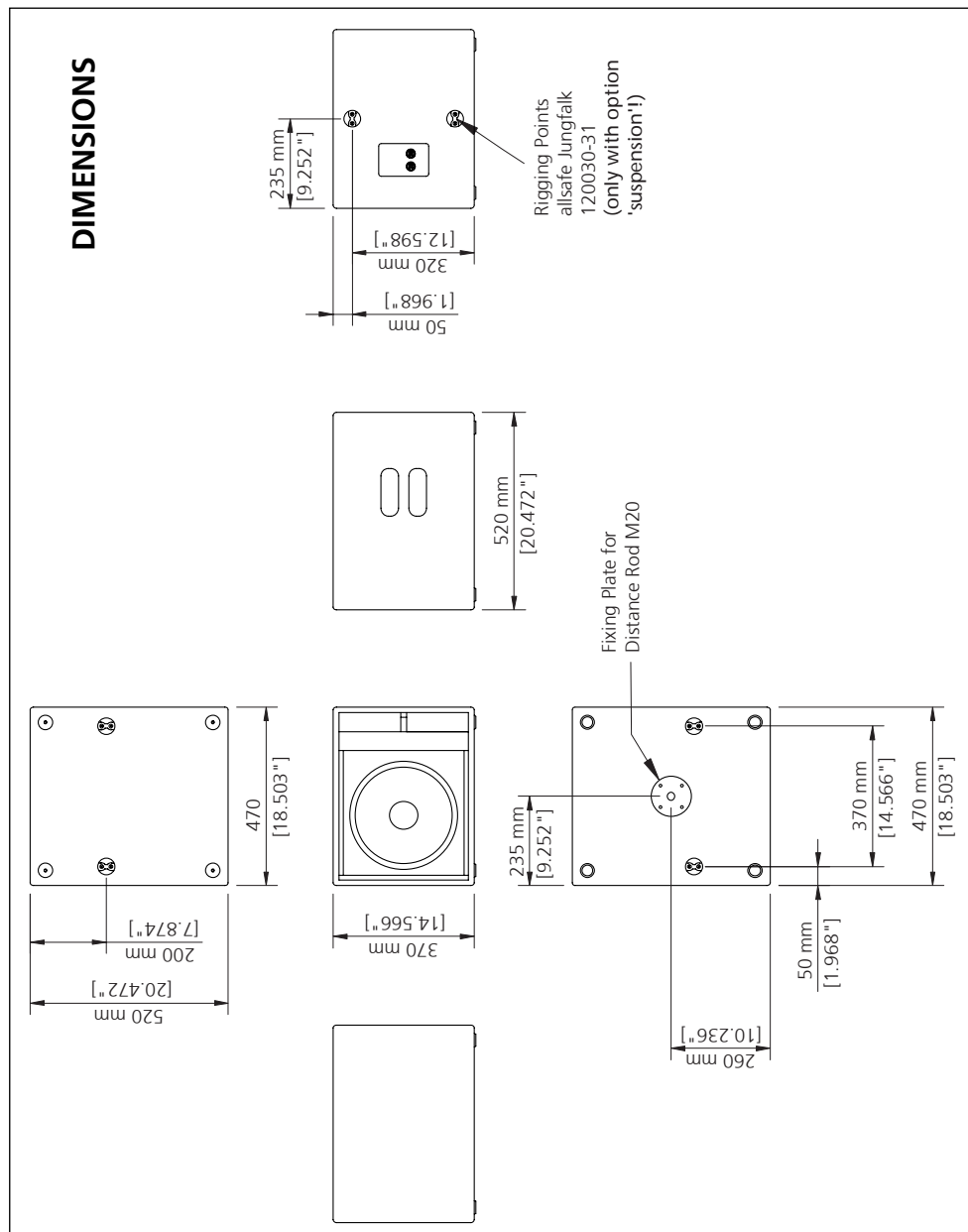
14.3.2 With optional Low-Pass Filter 'XO ON'



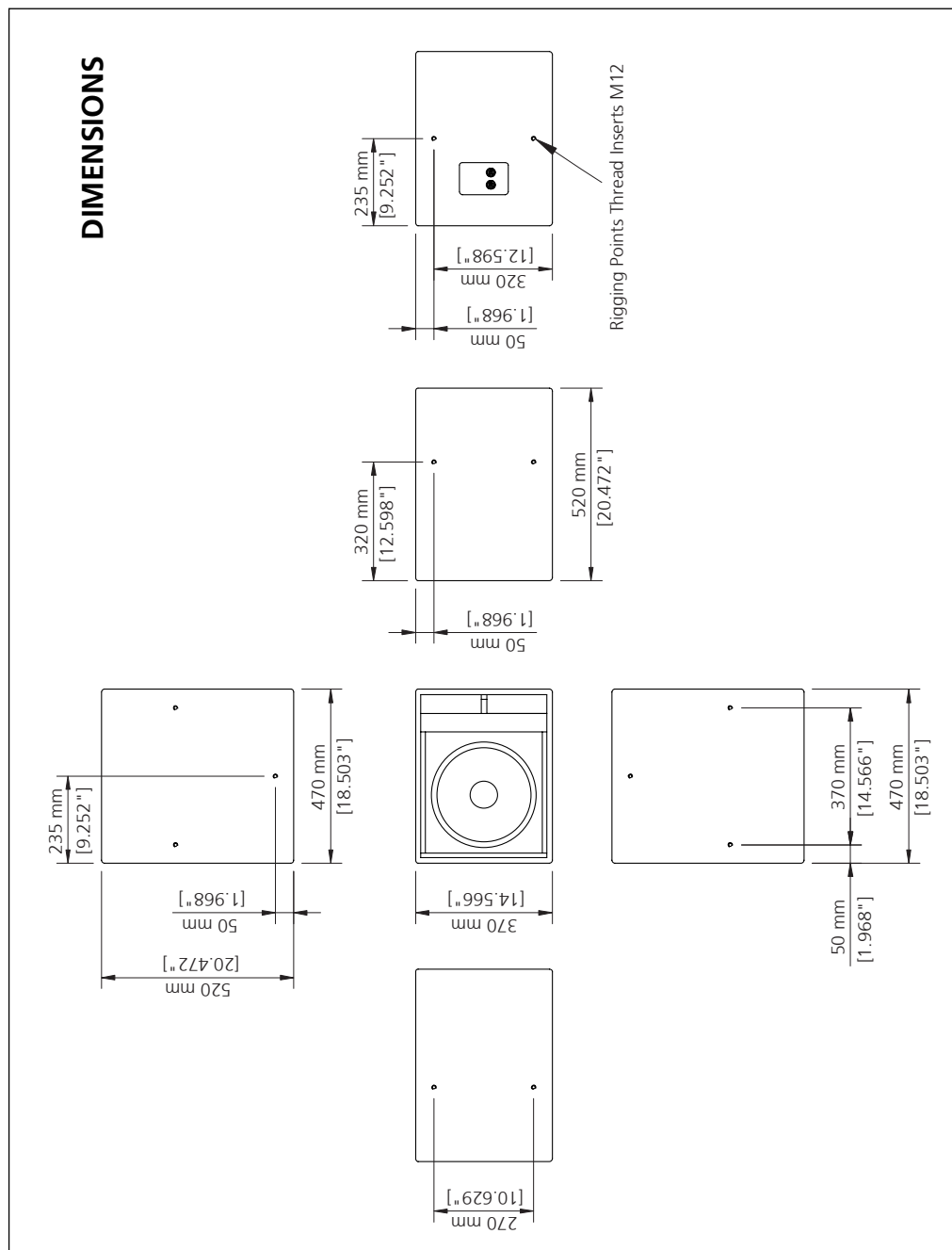
14.4 SW 215E

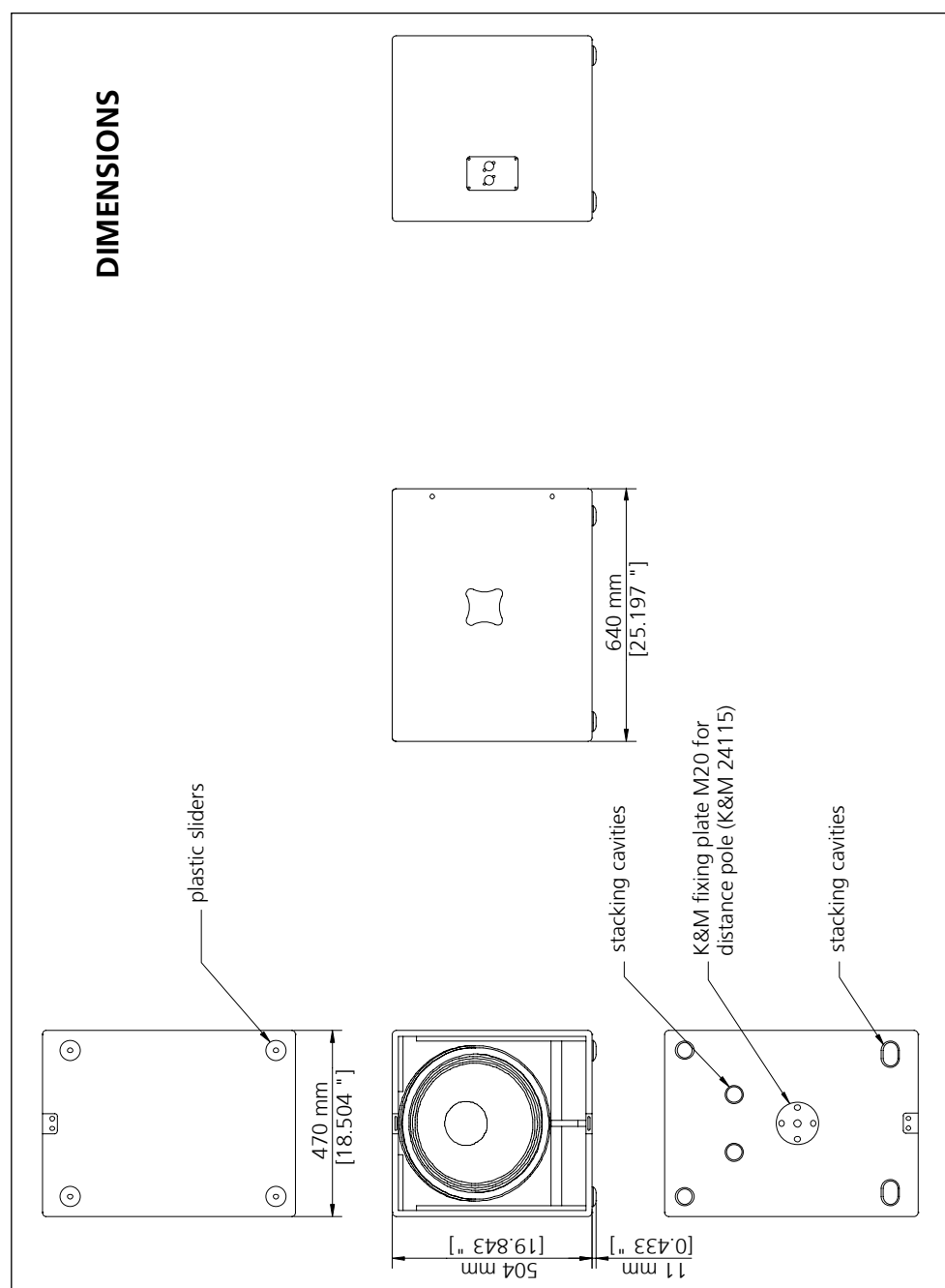
15. Dimensions

15.1 SW 112



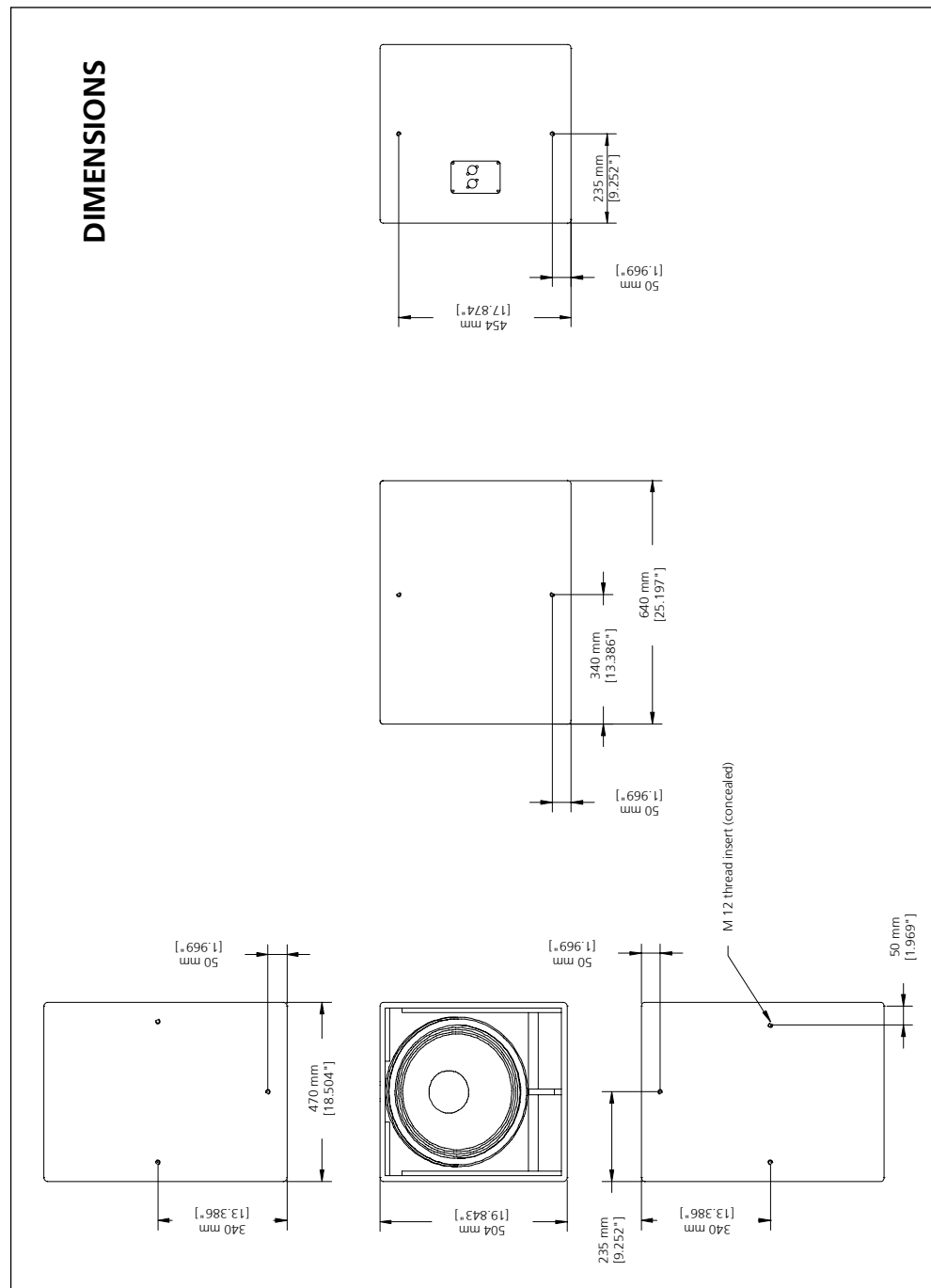
15.2 SWi 112

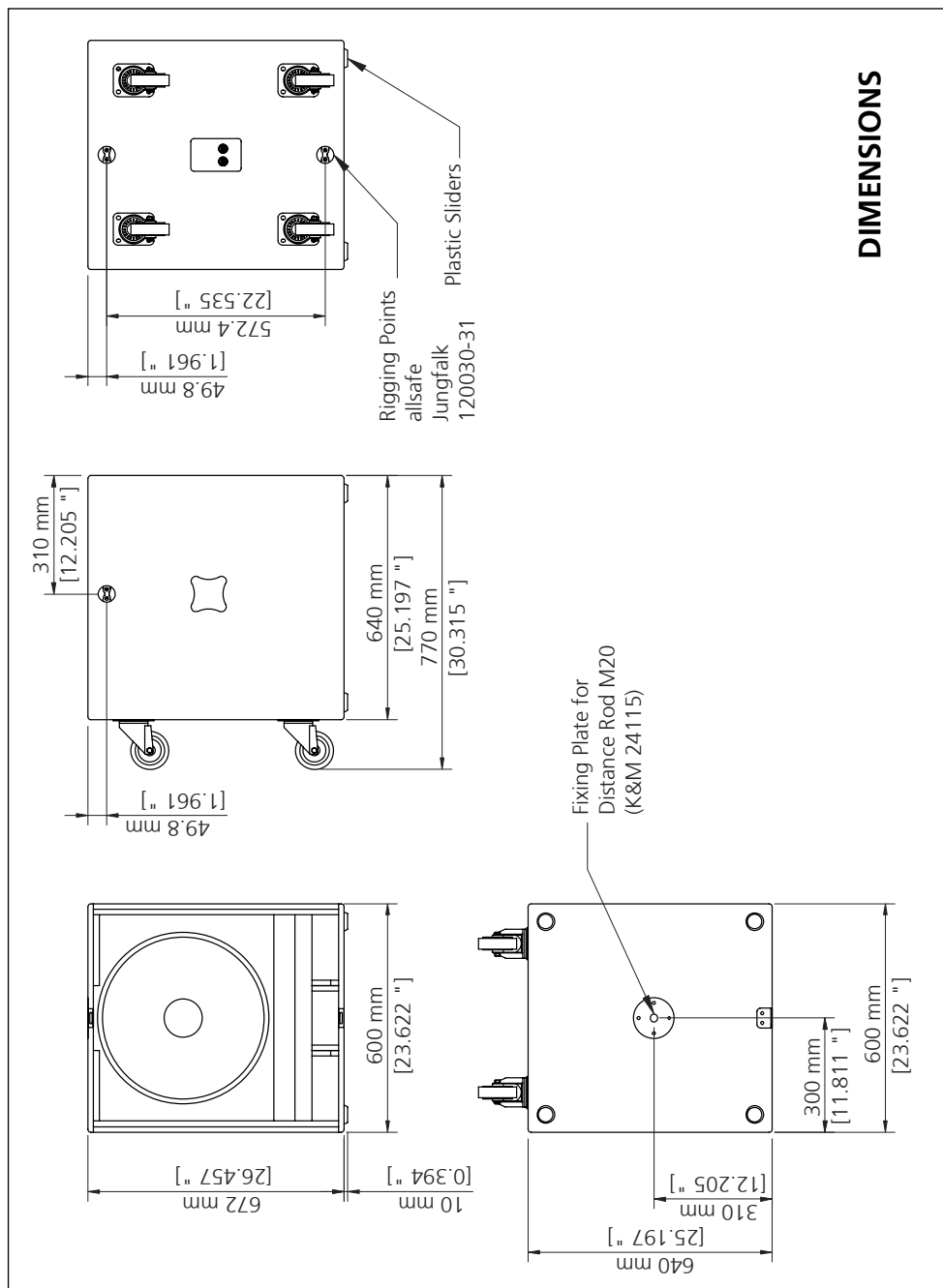


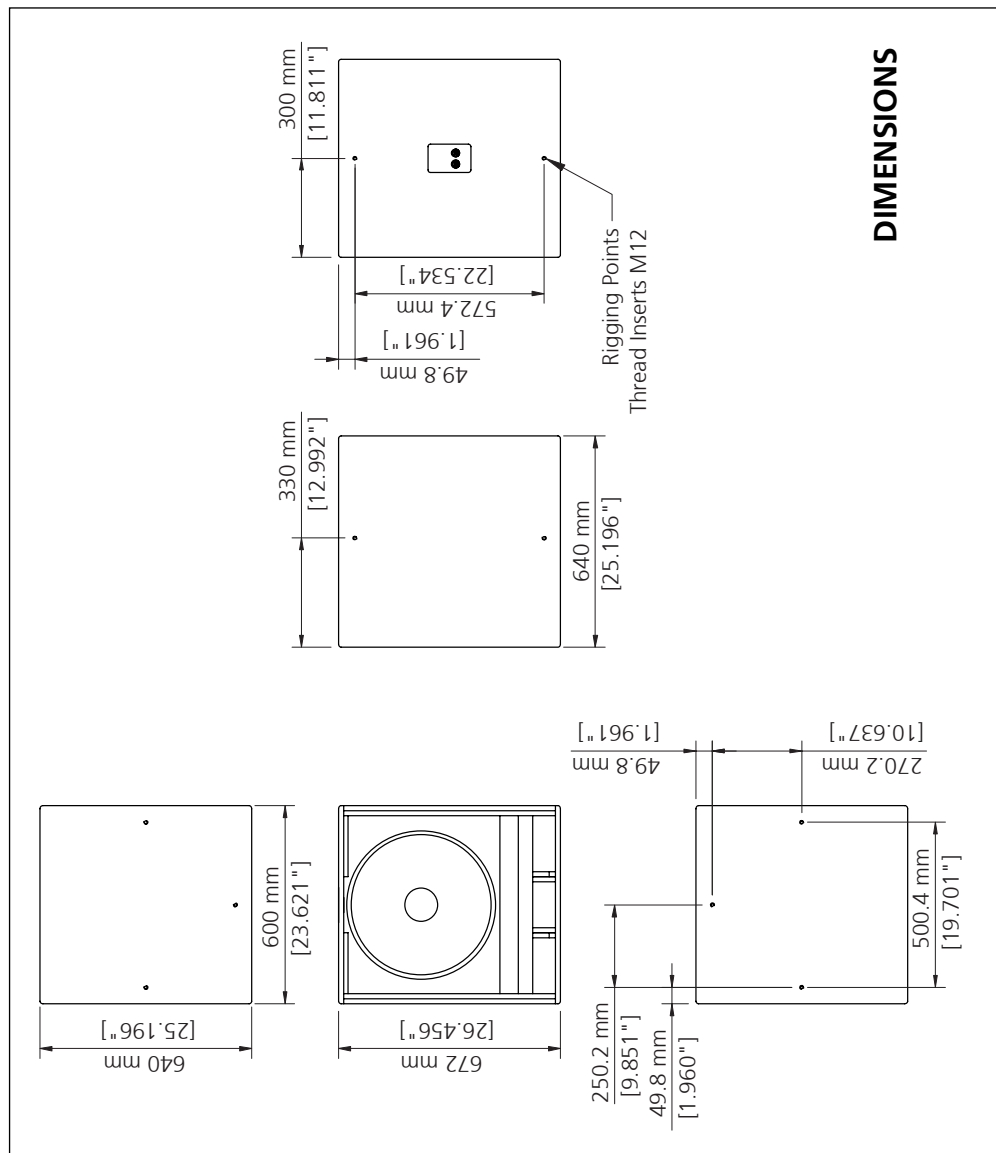
15.3 SW 115E

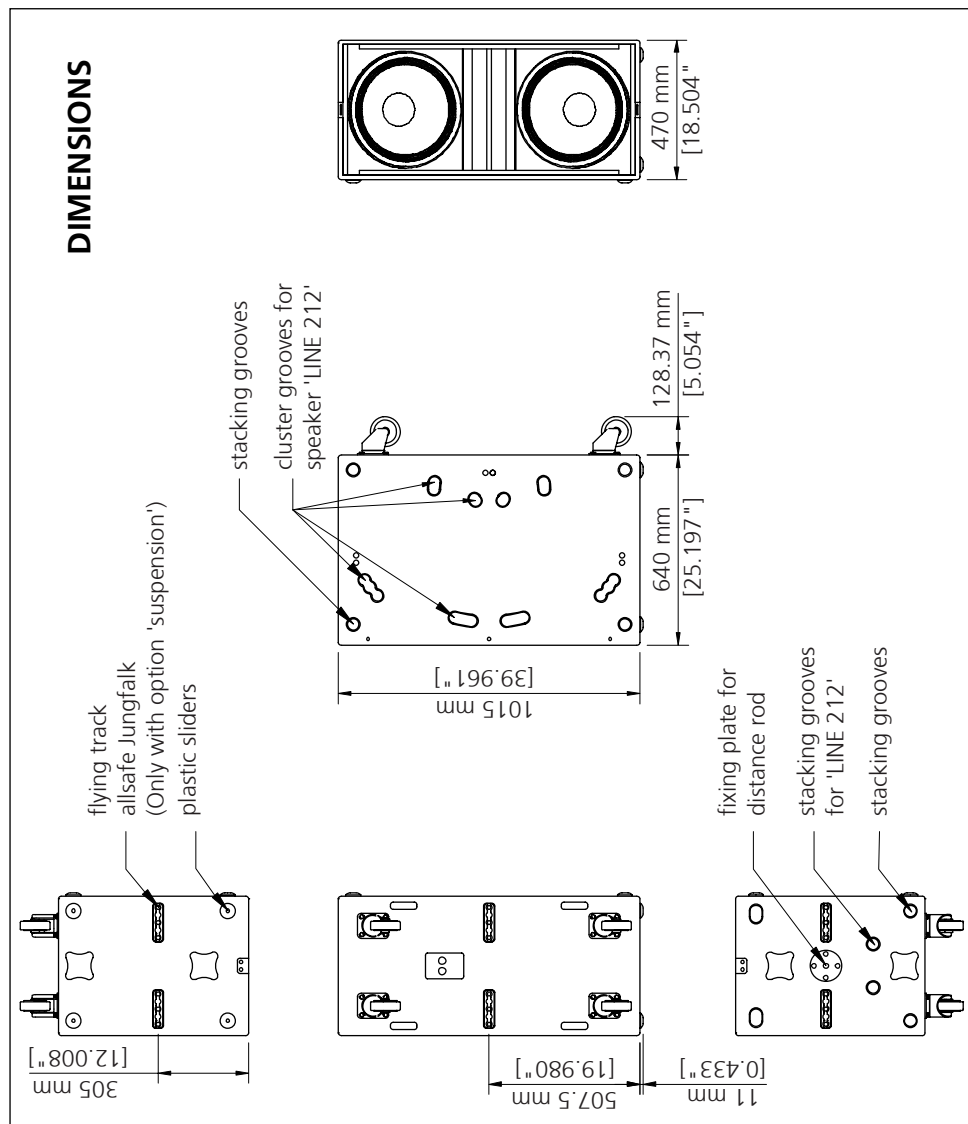
15.4 SWi 115E

DIMENSIONS



15.5 SW 118E

15.6 SWi 118E

15.7 SW 215E

16. Regulations for Disposal

16.1 Germany:

It is not allowed to dispose of used electrical equipment as domestic waste.

But please do not dispose of them at official collecting points for recycling either!

All Kling & Freitag products are plain business-to-business (B2B) products. Disposal of Kling & Freitag products labelled with a waste bin sign have thus to be disposed of by Kling & Freitag alone. Please call Kling & Freitag at the number stated below if you have a Kling & Freitag product to be disposed. We will offer you a straightforward and professional disposal not affecting costs.

If there is no dustbin sign on one of your Kling & Freitag products, because they have been sold before March 2006 then by law the owner is in charge of the disposal. For these we will be happy to assist and offer you proper ways of disposal.

**Telephone number to call about the disposal of used Kling & Freitag products:
+49 (511)-96 99 7-0**

Explanation:

With the ElektroG (law relating to electrical and electronic equipment and appliances) we have complied with the EU-directive on waste electrical and electronic equipment (WEEE, 2002/96/EC)

The Kling & Freitag AG has thus labelled all products mentioned in the WEEE from 03/24/2006 onwards with a sign with a crossed out waste bin and a white bar below. This sign indicates that the disposal into the domestic waste is prohibited and that the product has been put into circulation at the 03/24/2006 earliest.

The Kling & Freitag GmbH has been legally registered as a manufacturer with the registration office EAR. Our WEEE Registration-Nr. is: DE64110372

For the German Registration office EAR we have accredited that our products are sole B2B products.



16.2 EU, Norway, Island, and Liechtenstein (not Germany):

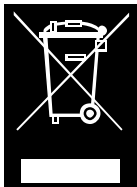
It is not allowed to dispose of used electrical equipment as domestic waste.

The Kling & Freitag AG has thus labelled all products coming from EU-Member countries as well as Norway, Island and Liechtenstein (except Germany) mentioned in the WEEE from 08/13/2005 onwards with a sign with a crossed out waste bin and a white bar below. This sign indicates that the disposal into the domestic waste is prohibited and that the product has been put into circulation at the 08/13/2005 earliest.

Unfortunately the European directive WEEE has been complied with implementing different national provisions of law throughout all member countries, which makes it impossible for us to offer consistent solutions for the disposal throughout Europe.

Responsible for complying with these provisions of law is the local distributor (importer) of each country.

For proper disposition of used products in accordance with these local provisions in the mentioned countries of the European Union (except Germany) please ask your local dealer or the local authorities.



16.3 Other countries

For proper disposition of used products in accordance with local provisions in other countries please ask your local dealer or the local authorities.